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NON-MOTORISED TRANSPORT AND PEDESTRIAN NETWORKS

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1. INTRODUCTION

Walking is the most basic form of transportation. Everyone is a pedestrian, including persons using wheelchairs and other forms of mobility assistance. Transit or automobile trips begin and end with a walk. Walking is often the quickest way to accomplish short trips in urban areas.

Walking is often recommended as a gentle exercise for people of all ages, but the transportation role of walking is still vastly under-utilized. Many people may not realize how much walking they do, since most other trips (driving or transit) are linked by walk. The exercise benefits of walking are being promoted, which could lead to increased walking as a transportation mode. Many cities are creating pedestrian-oriented zones, which are very popular.

Bicycling is the most energy efficient form of transportation ever devised, getting the energy equivalent of up to 1,500 miles per gallon (according to an MIT study). The bicycle's status has fluctuated through the years, and has been more often considered a child's toy than a valid mode of transportation. Some people have turned to bicycles for transportation and recreation, but many inexperienced riders feared motor vehicles. This viewpoint may have led to the bike path trend of the 1970's. Paths attempted to separate the bicyclists from the motorized traffic to reduce conflicts. Keeping cyclists off the road with paths was not the total answer - paths function well in some areas and poorly in others.

Today, cyclists and motorists share the road. The two modes are integrated by improving roadways to accommodate cyclists, conserving funds and uniting users under one set of rules for better cooperation and safer operation. Modern bikeways do more than accommodate bicyclists - they invite them to use the roads.

A transportation system that is readily accessible to bicyclists and pedestrians is indeed very important. Successful bikeway and walkway plans are integrated into the overall transportation plan of a city, region or state. They reflect the mobility and access needs of a community, and are placed in a wider context than simple movement of people and goods. Issues such as land use, energy, the environment and livability are important factors.

Bikeway and walkway planning undertaken apart from planning for other modes can lead to a viewpoint that these facilities are not integral to the transportation system. If bikeways and

walkways are regarded as amenities, bicycling and walking may not receive sufficient consideration in the competition for financial resources and available right-of-way.

2. RELATION TO LAND USE

The ease of bicycling and walking is often determined by land use patterns. Much of recently built development creates a situation where an automobile is required for most trips:

- Segregated land use increases the distance between origin and destination points;
- Businesses are designed to be readily accessible by automobile: buildings are set back and separated from the roadway with parking;
- The transportation system discourages bicycling and walking, due to high traffic volumes and speeds.

Land use patterns conducive to bicycling and walking include:

- Greater housing densities allow more residents to live closer to neighborhood destinations such as stores and schools;
- Mixed-use zoning allows services such as stores and professional buildings to be closer to residential areas, making it easier to access these facilities on foot or by bicycle;
- Multiple-use zoning allows residences and businesses to share the same structure, reducing travel demands;
- Locating buildings close to the street allows easy access by pedestrians;
- The preservation of open spaces between communities creates a greenbelt, a natural buffer that helps prevent urban sprawl; and
- Resolving conflicts with neighborhood traffic management (traffic calming) makes streets more inviting to walkers and cyclists.

Integrating land-use and transportation planning allows new developments to implement these strategies from the onset. Communities planned to support balanced transportation make walking, bicycling and public transit attractive options (adjacent land-use affects transit ridership).

In established communities, many of these goals can be met with "in-fill development" to increase density, changes in zoning laws to allow mixed-use development, and building bicycle and pedestrian connections.

3. BENEFITS OF BICYCLING & WALKING

Increased bicycling and walking will help:

- Improve public health and well-being through regular exercise.

- Reduce traffic congestion;
- Reduce air and noise pollution;
- Reduce wear and tear on our roads;
- Reduce consumption of petroleum;
- Reduce crashes and property damage;
- Reduce the need for additional roads, travel lanes and parking.

Providing bikeways and walkways also helps meet the needs of a large segment of the population who do not have access to an automobile - the "transportation disadvantaged":

- The poor;
- The young;
- The elderly;
- People with disabilities; and
- Others who do not use a motor vehicle for a variety of reasons.

Bicycling and walking are low-cost transportation modes available to all. Walking and bicycling are often their only transportation choices, especially in areas not served by public transportation. Walkways and bikeways create new opportunities for these groups to participate in the social, cultural and economic life of the community.

Walkways and bikeways enable school children to walk or bike more safely and conveniently to school, reducing the need for busing or automobile trips by parents.

Good bicycle and pedestrian facilities also benefit other transportation modes:

- Transit users benefit from safer, more convenient access;
- Motorists and freight carriers benefit from reduced congestion and wear and tear on our roads when more people switch from driving to other modes;
- Paved shoulders on rural highways have many safety benefits for motorists and reduce roadway maintenance costs; and
- Motorists benefit from an improved pedestrian environment: where there are sidewalks and street crossing opportunities, a person can park a car once to access several destinations. This reduces the need for additional parking spaces, "circling the block," or driving from one shopping center to the next, common behavior in urban areas without good pedestrian systems.

A bicycle and pedestrian friendly environment can have impacts beyond transportation:

- Many cities in other countries have experienced economic benefits by enhancing non-auto transportation. Businesses benefit from improved access and an environment more conducive to "window-shopping" and strolling.
- The number of people who feel comfortable walking or riding bicycles is a measure of the quality of life of a city, county or state.

- The presence of pedestrians and bicyclists in a city indicates that the sense of community is strong, people feel safe being outdoors, social interactions can occur openly, and children and the elderly can have access to public and private facilities.
- Tourism is an important industry, and Malaysia's natural beauty and bicycle-friendly reputation may attract tourists from other countries.

While bicycling and walking won't replace all trips, walking or biking can be practical for many purposes:

- Trips to work or school;
- Visits to friends and relatives;
- Visits to offices for an appointment;
- Errands such as buying bread;
- Children's sports or tuition;
- Combined trips, such as a recreational bike ride while looking at garage sales; and
- Trips combined with other modes, such as walking to a bus stop or riding a bicycle to a car pool or park-and-ride facility.

4. BICYCLING & WALKING IN SUB-URBAN AND RESIDENTIAL AREAS

Sub-urban and residential areas benefit most from improved bicycle and pedestrian transportation facilities because:

- Most people live in sub-urban and residential areas;
- Sub-urban and residential areas have high concentration of origin and destination points;
- Grocery stores, shops and services are more accessible to those without cars;
- Average trip distances are short (typically under five kilometers), and short trips are the ones most easily made by bicycling or walking. Short automobile trips:
  - Create much of the congestion on urban streets;
  - Contribute to urban air pollution;
  - Contribute to many of the crashes in urban areas.

5. ACCOMMODATING BICYCLISTS & PEDESTRIANS ON EXISTING STREETS

Effective walkway and bikeway networks are best achieved by modifying the existing street system, rather than trying to create a separate network, for several reasons such as follows:

- *The street system already exists*: most streets have been in place since before the widespread use of the automobile. Many resources have been dedicated to creating this system. Creating a totally new infrastructure for pedestrians and bicyclists may not be financially or physically feasible;

- *Streets take people where they want to go*: virtually all destinations are located on a street, such as homes, businesses, shops and schools. People walking or bicycling need access to these same destinations;

- *Streets can be made safer*: bicycle crashes are not necessarily a result of collisions with motor vehicles; bicyclists riding responsibly with traffic are at relatively low risk. Pedestrians are safer and more secure when they are on sidewalks and visible. Good transportation policies are based on the premise that the public right-of-way is to be shared by all travel modes: well-designed roads accommodate all users.

6. SAFETY OF BICYCLISTS AND PEDESTRIANS

The accident statistics for the country have shown that pedestrians form the second highest fatalities amongst all road users involved in accidents after motorcyclists. Bicyclists form a smaller number of fatalities, namely due to the small number of cyclists on the road as compared to other category of road users. People who walk or ride bicycles are the most vulnerable road users, being less protected from the weather and more likely to be injured in a collision with a motor vehicle; they must often use facilities that were designed primarily for automobiles. Some of the possible approaches towards improving the level of safety for these categories of road users may be described in the following passages.

(a) ENGINEERING SOLUTIONS

Even though many bicycle/motor vehicle crashes may be caused by improper behavior, many improvements can be made to roads to reduce the potential for crashes. Well-designed facilities encourage proper behavior, decreasing the likelihood of crashes. Transportation agencies should provide bicycle facilities that encourage all users to obey the rules of the road.

When surveying bicycle usage, the Bicycle and Pedestrian Program for Oregon Department of Transportation records several behaviors. There appears to be a correlation between good facilities, high use and proper behavior:

- Cities with good bikeway networks have the highest number of riders, and behavior is the best: wrong-way riding is minimal and fewer ride on the sidewalk (helmet use is above the statewide average).

- Cities with fewer facilities experience lower ridership numbers and poorer rider behavior: more ride against traffic or on the sidewalks (helmet use is lower than the statewide average).

(b) EDUCATION SOLUTIONS

Education of both motorists and bicyclists can curtail unintentional infractions as well as promote other safe riding and driving practices. For bicyclists to safely coexist with motorists, they need to understand the vehicle code and develop good cycling skills. Education provides these skills and knowledge. Comprehensive bicycle safety education programs are designed for each age group with emphasis on errors commonly committed by that group. On-bike training is an important element of such a program. Education also stresses the value of helmets and other protective measures.

A comprehensive bicycle safety education program is needed. Adequate funds, expert personnel, and persons or agencies directly responsible for bicycle safety education are needed to improve programs. Volunteer service groups, the police departments and the private sector could contribute much in this respect. Often, only elementary school age children are selected as the target group.

(c) ENFORCEMENT SOLUTIONS

Law enforcement is a necessary component of bicycle safety. Stricter enforcement can limit both intentional and unintentional infractions. As with any law, lack of enforcement leads to a general disregard of the law. Local police officers should be willing to enforce the motor vehicle code with bicyclists and motorists.

Frequent contact between local bicycle advisory committees, traffic safety groups and the police can highlight the need for enforcement and identify problem areas. Significant violation problems that have could be identified by the bicycling community may include:

- Motorists not yielding to bicyclists;
- Motorists not giving bicyclists enough room on the roadway;
- Bicyclists running traffic signals;
- Bicyclists riding on sidewalks;
- Bicyclists riding the wrong way;
- Bicyclists riding at night without lights.

Bicycle-mounted police can often more easily apprehend offenders. Community education and support of enforcement efforts builds respect between bicyclists and motorists.

(d) EQUIPMENT SOLUTIONS

There are several bicycle features that contribute to riders' ability to control their movements, namely:

- *Size*: a bicycle must be properly fitted. If it is too small or too big, the rider will have trouble reacting properly when stopping, turning or accelerating. The wrong size bicycle is also uncomfortable, leading to fatigue.

- *Brakes*: by law, brakes must be sufficiently powerful to enable a rider to bring a bicycle to a skid on dry pavement. Brake levers must be readily accessible.

- *Tires*: must be in good condition and inflated to their recommended pressure.

- *Fenders*: prevent lights and reflectors from getting dirty in wet weather.

- *Luggage racks and panniers*: bicyclists should never attempt to carry loads in their arms while riding.

- *Lights*: when riding after dark, the bicycle or the rider must be equipped with a white light visible to the front and a red light or reflector visible to the rear. A rear light is more effective than a reflector. The front white reflectors sold with bicycles do not provide visibility to a motorist entering from a side street.

(e) RIDING SKILLS

Poor riding skills could be responsible for many injury crashes. By ensuring that one has a good sense of balance, by looking ahead and to the sides, by avoiding distractions such as personal stereos, and by ensuring that one's bike is in good working order, falls and collisions with fixed objects can be largely avoided.

Many crashes with motor vehicles could be avoided if riders learned to control their bicycles better, including riding in a straight line and turning or stopping faster to avoid collisions.

(f) HELMETS

Wearing a helmet does not reduce the chances of a crash, but can reduce the severity of injuries or the possibility of a fatality. A properly worn bicycle helmet can reduce the severity of head injuries by up to 80%. Many communities in developed countries are promoting awareness campaigns aimed at increasing helmet use, especially among children. Proper fit is an important aspect of responsible helmet use.

7. ACCESS MANAGEMENT VIS-À-VIS BICYCLISTS AND PEDESTRIANS

(a) Problems with Uncontrolled Access

Urban thoroughfares should accommodate bicyclists and pedestrians, but these streets are often perceived as undesirable for non-motorized travel because of high traffic volumes and speeds. Yet conflicts rarely occur with users traveling in the same direction: most conflicts occur at intersections, driveways and alleys.

Unlimited access creates many conflicts between cars entering or leaving a roadway and bicyclists and pedestrians riding or walking along the roadway, who are vulnerable if motorists fail to see or yield to them.

Pedestrians crossing a roadway require gaps in the traffic stream, but with unlimited access, vehicles entering the roadway quickly fill available gaps.

(b) Benefits of Access Management to Bicyclists & Pedestrians

By limiting and consolidating driveways, by providing raised or landscaped medians, or by creating frontage roads, bicyclists and pedestrians benefit in several ways:

- The number of conflict points is reduced; this is best achieved by replacing a center-turn lane with a raised median (right turns could account for a high number of crashes with bicyclists and pedestrians);
- Motor vehicles are redirected to intersections with appropriate control devices;
- Pedestrian crossing opportunities are enhanced with an accessible raised median and fewer conflicts with turning cars;
- Accommodating the disabled is easier, as the need for special treatments at driveways is reduced;
- Traffic volumes on the arterial may decrease if local traffic can use other available streets or frontage roads for local destinations;
- Improved traffic flow may reduce the need for road widening, allowing part of the right-of-way to be recaptured for bicyclists, pedestrians and other users.

While new roads can be designed using these principles, it is more difficult to retroactively reduce, consolidate or eliminate existing accesses. Yet this is an important strategy to make existing roads more attractive to bicyclists and pedestrians.

(c) Negative Impacts of Access Management to Bicyclists & Pedestrians

Limiting the number of street connections may have a negative impact on non-motorized mobility, especially for pedestrian crossings:

- Creating a thoroughfare may increase traffic speeds and volumes;
- Eliminating local street crossings eliminates pedestrian crossing opportunities, reduces pedestrian and bicycle travel choices, and may increase out-of-direction travel;
- Reduced access to businesses may require out-of-direction travel, discouraging walking and bicycle trips;
- Placing concrete barriers down the middle of the road (rather than a raised or landscaped median) effectively prohibits pedestrian crossings;

- Improperly designed raised medians act as barriers: pedestrians should be able to see to the other side of the street (vegetation should not decrease visibility) and curbs should be no more than standard height.

Where limited access thoroughfares exist in urban areas, safe and frequent crossings should be provided. Parallel local streets should be improved for bicycle and pedestrian circulation as well.

8. PUBLIC TRANSIT AND NON-MOTORISED MODES

It is quite usual to find in developed countries transit trips begin and end with a walk or bike ride. Pedestrian and bicycle facilities in transit corridors make transit systems more effective. Therefore, high priority should be given to providing sidewalks and bikeways on transit routes and on local streets feeding these routes from neighborhoods.

Transit users need to cross the road safely at stops. On a typical two-way street with residences and development on both sides, half the riders will need to cross a road when boarding or exiting a bus.

Bus stops should provide a pleasant environment for waiting passengers, with shelters, landscaping, adequate buffering from the road and lighting. Bus stop design should minimize conflicts with other non-motorized users, such as bicyclists on bike lanes or pedestrians walking past passengers waiting to board.

Bus stops should be placed in locations that are readily accessible by pedestrians, or that can be made accessible by changing the configuration of adjacent land use. This can be done by:

- Orienting building entrances to the transit stop or station;
- Clustering buildings around transit stops; and
- Locating businesses close to transit stops.

Regional and statewide public transportation systems benefit from bicycle facilities such as:

- Accommodating bicycles on buses and trains;
- Bikeways leading to stations, transit centers and park-and-ride lots;
- Secure bicycle parking provided at these locations.

9. TRANSPORTATION DEMAND MANAGEMENT AND NON-MOTORISED TRANSPORT MODES

Transportation Demand Management (TDM) includes transportation actions that reduce peak period Single Occupant Vehicle (SOV) travel, spread traffic volumes away from the peak period or improve traffic flow. TDM is intended to ease demand on the transportation system by using low-cost strategies that encourage a more efficient use of existing facilities.

Commonly used strategies include park-and-ride lots, carpooling, vanpools, express bus service, bicycling, walking, group transit passes, parking management, impact fees, ramp metering, reversible lanes, signal synchronization, bus bypass lanes, trip reduction ordinances, compressed or staggered work schedules, flexi-time and telecommuting.

These strategies tend to be most successful where there are:

- Heavily congested commuter corridors;
- Clearly identifiable work trip travel patterns;
- Clearly identifiable trip origins and destinations;
- Large employer work sites or clusters of small employer work sites;
- Environmentally concerned employers;
- Community commitment to clean air;
- Constrained parking at employer work sites; and
- Available transportation alternatives.

TDM is most effective where strategies are linked and users are offered a combination of viable transportation choices and incentives.

The relationship between TDM and bicycling and walking is two-fold:

1. Encouraging more employees to commute by bicycle and on foot can be part of a package of incentives;

2. Successful TDM strategies can reduce the volumes of traffic on roadways at peak hours, with the following consequences for bicyclists and pedestrians:

- Reduced traffic volumes may render the roads less intimidating to bicyclists and walkers;

- Reduced traffic volumes may decrease the need for additional capacity, freeing up funds and right-of-way for bicycle and pedestrian facilities.

10. PLANNING FOR BICYCLISTS

Experiences in developed countries have shown that two prior planning concepts have not proven effective in establishing networks, namely, designating "Bike Routes" and classifying bicycle riders into different types.

(a) DESIGNATED BIKE ROUTES

Most bikeway planning has depended on designated Bike Routes; some attempts have also been made to designate Pedestrian Routes. Problems arise when the needs of bicyclists and pedestrians are not taken into consideration, with routes chosen mainly to minimize the impact on motor vehicle traffic.

Disadvantages of plans based on bike or pedestrian routes are as follows:

- The best routes are not chosen: if routes are indirect, inconvenient or don't serve origin and destination points, current riders and walkers may ignore them, while others see no incentive to take them; pedestrians tolerate very little out-of-direction travel.

- Other potential routes are missed: roads that are not yet built should be designed to accommodate bicyclists and pedestrians; existing streets may need to better accommodate bicyclists and pedestrians if their functional classification is upgraded.

- Thoroughfares are excluded: arterials usually serve the community well, with many origin and destination points; well-traveled streets provide a sense of security for walkers, due to the presence of other people.

- It may be implied that bicyclists and pedestrians should only use certain streets: the public right-of-way should include, not exclude, bicyclists and pedestrians; roads should be designed to properly accommodate them.

- Improvements may go no further than the placement of BIKE ROUTE signs: allocating road space to bicyclists, improving road conditions or removing obstacles to bicycling are more effective ways to make streets more "bicycle-friendly."

- Improvements for walking and bicycling are restricted to the routes: bikeways and walkways are often built as part of road improvement projects, or when other opportunities arise; opportunities may be missed when modifications are made to roads not on designated routes (every road project is a potential bikeway and walkway project).

The proper approach would be: All roads open for public use should be considered for their potential to improve bicycling and walking, based on need and road characteristics.

(b) DEFINING BICYCLE TRAVEL & RIDER TYPES

Some plans have segregated bicyclists into four general use categories (recreational, commuting, touring and racing), or according to skills - riders with highly developed skills, riders with moderate skills, and children and beginners.

A more desirable approach would be: Facilities should safely accommodate the majority of users. Roads designed to accommodate cyclists with moderate skills will meet the needs of most riders; special consideration should be given close to school areas, where facilities designed specifically for children should be provided. Roads designed to accommodate young, elderly and disabled pedestrians serve all users well.

11. HOW TO INCREASE BICYCLING & WALKING TRIPS?

11.1 CONSTRUCTION OF FACILITIES

Physical improvements to the system are a logical first step. Without safe and convenient facilities, few people will walk or bike - the potential to increase use is limited by the quality of available facilities.

11.2 PROMOTIONAL CAMPAIGNS

Increases in recycling and seat belt use have resulted from successful campaigns aimed at changing behavior. Similar efforts could be applied to encourage increased bicycling and walking. Successful campaigns portray a positive image of walkers and bicyclists, emphasize the benefits of bicycling and walking, and inform the public of the drawbacks associated with over-reliance on the automobile.

Even in countries with high bicycle use, promotional campaigns make a difference: the Netherlands has the highest rate of bicycle use in Europe (close to 30% of all trips); yet the city of Groningen has promoted bicycle use to an impressive 50% of all trips.

11.3 INCENTIVES

People who walk or bicycle are often at a disadvantage, facing impediments such as roads designed primarily for motor vehicles, lack of protection from the weather, inadequate parking for bicycles at destinations and inadequate connections with other modes. To encourage greater use, incentives and rewards can include:

- Financial incentives such as tax breaks or compensation for not using automobile parking spaces;
- Facilities such as secure bicycle parking, showers and changing rooms;
- Work schedules that allow commuters to ride or walk;
- Relaxed dress codes;
- "Guaranteed Ride Home" by taxi, for emergencies when walking and cycling aren't practical;
- Awards and other forms of recognition.

11.4 OTHER FACTORS

Establishing walkways and bikeways along roadways is only part of what is needed to create a pedestrian and bicycle-friendly environment. There are many improvements that make a transportation system more accessible and hospitable to pedestrians and bicyclists.

Some of these issues can be dealt with by transportation officials, and others require support from other agencies and citizens to bring about changes. These include amending land use zoning laws, enforcing traffic laws that protect pedestrians and an overall commitment to create a more human-scale urban landscape.

(a) Weather

Malaysia is known for its wet climate with rains all year round. At the same time it is also having abundance sunshine to be enjoyed everyday. Both of these weather conditions have been looked upon as factors that may deter people from walking and bicycling around. The relatively high humidity is also blamed as making walking and cycling not being attractive options. How far this perception is true is not very certain and perhaps in-depth studies on this could help. Perhaps, different communities may have different perceptions toward walking and cycling. A year-long study conducted in the US state of Oregon have shown that the myth that the climate is too wet, too cold or too dark for year-round commuting was found to be untrue. Rain doesn't deter many cyclists and walkers from using these modes year-round. Traveling in the dark may be more of a deterrent than weather.

(b) The Ease of Using an Automobile

The experience of campaigns to promote alternate modes in the US indicates that increasing the attractiveness of these modes is often insufficient to make substantial changes in travel behavior. When driving is inexpensive and convenient, other modes such as walking, bicycling and mass transit cannot compete effectively. Reducing the attractiveness of driving alone can help make other means of transportation relatively more attractive. Observations of travel patterns in other developed nations indicate a correlation between the relative ease of driving and the use of other modes.

Some factors that decrease the attractiveness of driving alone are high gasoline prices, vehicle registration fees and parking rates; low availability of parking; and restricted driving privileges in town centers and other high pedestrian use areas.

With increases in traffic congestion and other related problems, the public, transportation planners and elected officials increasingly recognize the desirability to decrease auto use and increase alternatives.

(c) Land Use

Many land use practices result in long distances between origin and destination points, requiring an automobile for most trips.

Zoning for high densities of employment, housing and mixed-use development places origin and destination points closer together, creating a more pedestrian and bicycle-friendly environment. This can be done more easily in new developments, but can be retrofitted into established areas with neighborhood commerce zoning.

(d) Connecting Streets

Disconnected streets and cul-de-sacs create long travel distances, even though the actual distance from origin to destination may be fairly short, making walking and bicycling impractical.

A grid street system provides continuity for pedestrians and bicyclists along the shortest routes; lacking this, disconnected streets can be improved with connecting paths.

(e) Street Crossings

Wide multi-lane roadways are difficult to cross on foot. Crossing opportunities can be provided with techniques such as raised medians, refuge islands, curb extensions and pedestrian signals, where appropriate.

(f) Intersections

Intersections built for the movement of motor vehicles can be very difficult for pedestrians and bicyclists to cross. A network of streets with sidewalks and bike lanes does not fully accommodate pedestrians and bicyclists if intersections present obstacles. Free-turning movements for vehicles are particularly difficult situations.

Improvements for pedestrians include refuge islands, shorter crossing distances, reduced curb radii, crossings at right angles and slower traffic speeds. At busy interchanges, grade-separation for bicyclists and pedestrians may be needed.

(g) Access Management

Every driveway creates conflicts for pedestrians and bicyclists. One component of access management deals with the number of driveways connecting to the road. Reducing the number of driveways and limiting access from one or more directions improves pedestrian and bicyclist safety and comfort.

(h) Public Transit

Transit use is highly dependent on pedestrian access, yet some bus routes are located on streets without sidewalks. The adjacent land use must also be conducive to transit use. Bus stops located in areas where the wait is unpleasant, with inadequate protection from the weather, reduce transit use.

Shelters, benches and lighting increase the comfort of transit users. Bike parking at transit stops increases the area served by transit.

(i) Building Orientation

Buildings that are set back from the road with large parking lots in front are uninviting and difficult for pedestrians to access. Buildings close to, and oriented toward sidewalks, with

parking in the rear or on the side, are more likely to encourage pedestrian use and are more transit-friendly.

(jj) Traffic Noise & Perception of Danger

Roadways with sidewalks directly adjacent to noisy, high-speed travel lanes are perceived by most people as being undesirable for walking. Greater separation, as with planting strips (especially with trees), and slower traffic speeds increase the level of comfort for pedestrians.

(k) Lighting

People may be intimidated by dark streets at night; good lighting can make pedestrians feel safer.

(l) Topography

Road designers and engineers have very little control over the natural lay of the land, and residential areas built in hilly terrain will generate less potential foot or bicycle traffic than those built in flatter areas.

12. ACCOMMODATING THE DISABLED

Facilities planned and designed for non-motorised transport and pedestrians should accommodate all users including the disabled. For example, The Americans with Disabilities Act (ADA) in the US requires that transportation facilities accommodate the disabled. For most practical purposes, mobility- and vision-impaired pedestrians need special attention.

Pedestrian facilities should be designed so people with impaired vision can track their way across approaches and through intersections. Most recommended practices for sidewalk construction satisfy these requirements.

The most critical areas for the vision impaired are locations where the crossing points may not be readily apparent to motorists, for example at a corner with a large radius. There are several techniques that enhance the environment for the vision-impaired:

- Placing crosswalks in areas where they are expected (in line with curb cuts and sidewalks);
- Providing audible pedestrian signals at busy intersections;
- Using special surface texture at curb-cuts to identify the placement of the crosswalk.

13. CONCLUDING REMARKS

Non-motorised transport and pedestrians are fundamental elements of the transportation system, particularly in the urban and sub-urban environment. Although emphasis has appeared to be placed on motorized modes of transport in many transportation plans, this has to be reviewed and due recognition has to be given to the importance of all road users in gaining safe and effective access to the transportation networks. Facilities and networks for

non-motorised transport, particularly bicycles and pedestrians as well as the disabled, have to be planned, designed and incorporated as an integral component of any transportation plan.

Acknowledgement

Much of the content of this paper has been based on transportation studies conducted in the US, Europe and Australia. A major reference has been made to the Oregon Department of Transportation bicycle and pedestrian program.